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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,727	08/25/2006	Kazuto Nagata	2729-0117PUS1	2537

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EXAMINER

KATAKAM, SUDHAKAR

ART UNIT	PAPER NUMBER
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1621

NOTIFICATION DATE	DELIVERY MODE
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12/15/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No. 10/590,727	Applicant(s) NAGATA ET AL.	
	Examiner SUDHAKAR KATAKAM	Art Unit 1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,5,6,9-11,14,15,18-21,34 and 35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,6,9-11,14,15,18-21,34 and 35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of the application

1. Receipt of Applicant's request for continued examination filed on 14 Oct 2010 is acknowledged.

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 14 Oct 2010 has been entered.

2. In view of applicants' amendments to the claims, the previous 102(b) rejection has been withdrawn. However, with regard to 103(a) rejection for the claims, the applicants' arguments are not found persuasive. However, upon further consideration, a new ground(s) of rejection is made in view of different interpretation of the previously applied reference, and provide an explanation of the rejection.

Claim Objections

3. Claims 1 and 10 are objected to because of the following informalities: the last 3 lines in the claims, with regard to the limitation of X groups is not clear. Alternative language is highly useful for readable purposes. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

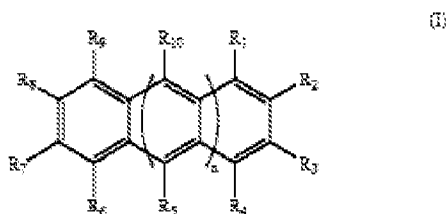
6. Claims 1, 2, 5, 6, 9-11, 14, 15, 18-21, 34 and 35 are rejected under 35

U.S.C. 103(a) as being unpatentable over **Minakata** (US 7,061,010 B2), **Nanpo** (JP

2004158719 A) and **Levinson et al** (WO 2000/056933 A1).

Determining the scope and contents of the prior art

Minakata teaches the following



compound:

[see column 2 and 3], which is used as

an organic semiconductor thin film [see column 1]. The derivatives of these polyacenes

may have functional groups such as aliphatic hydrocarbons (alkyls, alkenyls and

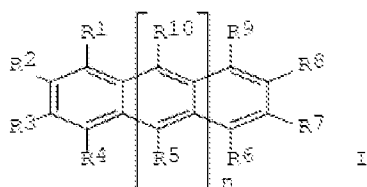
alkynyls, etc.), aromatic hydrocarbons (phenyl, naphthyl, etc.), alkoxyls, halogens, acyls

(benzoyl, etc.), esters, ethers, aminos, hydroxyl, amides, cyanos, silyls, photoreactive

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groups or combinations of two or more of these functional groups (benzyls, etc.) [see column 2 and 3].

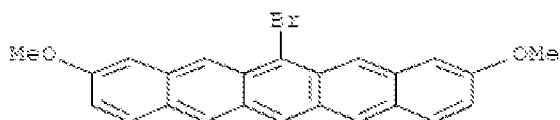
Nanpo teaches the following:



AB The title athene derivative semiconductor thin films are formed by PVD of an athene derivative (I: R1-10 = H, alkyl, alkynyl, alkenyl, aromatic hydrocarbon group, alkoxy, ether, halo, ketone, ester, amino, amide, cyano, silyl; 2i are non-H; n = 2-7) on a substrate, wherein its long axis of I is provided in vertical orientation to the substrate surface. The organic semiconductor thin films are deposited in level without defects, .

[see abstract from STN search, full translation is pending].

Levinson et al teaches the following compound:



[see abstract from STN search].

Ascertaining the differences between the prior art and the claims at issue

It appears prior art fails to teach applicants compound, where two halogens are bound to the same acene ring, and in combination with least one of R1-R4 is/are an alkyl or an alkoxy group having 1-15 carbon atoms.

Resolving the level of ordinary skill in the pertinent art

The prior art fairly established polyacenes, substituted with alkyl groups, alkoxy groups and halogens, and these compounds are useful in organic semiconductors.

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The prior art also further established that the properties of polyacene can be altered by introducing a functional group on the ring. For example, by the ring has a substitution of photosensitive group, then polyacene becomes a photosensitive, which is useful in light patterning material [see col.3, lines 28-65 of **Minakata et al**].

In chemistry point of view, a methyl group is electron donating properties, whereas F or Cl have electron attracting properties on a polyacene ring. Alkyl groups on the polyacene ring are prone to oxidation, and the oxidized polyacene is no longer organic semiconductor. Also the solubility properties can also be controlled by limiting the alkyl groups and F/Cl atoms on the ring. Therefore, the semiconductor properties can be controlled by restricting the alkyl and F/Cl atoms on the polyacene ring.

In case of instant claims, applicants introduced two halogens on the same ring of alkyl-substituted polyacene. First, the above cited prior art reads applicants claims. Second, the prior art also further established the properties can be altered by modifying the substitutions, so that to make the desired organic semiconductor. Therefore, all the claimed elements were known in the prior art and one skilled person in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to have yielded predictable results to one of ordinary skill in the art at the time of the invention.

**Considering objective evidence present in the application indicating obviousness
or nonobviousness**

In view of the above established prior art for polyacenes as organic semiconductor, the claim would have been obvious because the design incentives or market forces provided a reason to make an adaptation, and the invention resulted from application of the prior knowledge available, for polyacenes as organic semiconductor, in a predictable manner. Absent any showing of unusual and/or unexpected results, the art obtains the same effect on the semiconductor properties of polyacene. The expected result would be improved properties for the polyacene for the organic semiconductor industry.

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time of invention was made, to arrive at applicants' polyacene compound(s) with various combination of functional groups by using the teachings of above cited prior art, with a reasonable expectation of success. One would be motivated to make these compounds because of their commercial importance in the semiconductor thin film industry.

Response to Arguments

7. Applicant's arguments filed on 14 Oct 2010 have been fully considered but they are not persuasive.

Applicants argue that **Minakata** does not disclose a chemical structure or the characteristic of the polyacene compound which determines the semiconductor characteristic.

In fact, teachings of **Minakata** does read applicants compound and Minakata further teaches their compound use in the organic semiconductors [see the rejection above].

Applicants argue that the present patent application discloses a polyacene compound having the improved solubility and the oxidation resistance.

Prior art fairly established that the properties of polyacene is highly sensitive to the substitutions [see above rejection]. The alkyl groups are prone to oxidation, whereas F or Cl increases the solubility, and therefore, replacing alkyl with F or Cl will make the compound with improved solubility and oxidation resistance. These properties are predictable for a skilled person in the art in view of the chemical properties of the ring and substitutions.

Applicants argue that Minakata does not disclose that the number of the halogen groups and that they are bound to the same acene ring of the polyacene compound.

First, cited prior art reads applicants compound. Second, applicants' compound is within the purview of the artisan to modify the compounds through routine experimentation, in view of known properties of compound and substitutions, and arrive at instantly claimed compound with a reasonable expectation of success.

With regard to applicants filed declaration, in fact applicants' unexpected data is expected. Applicants introduced two Cl atoms on the polyacene ring, which are electron withdrawing properties, and expected to make the compound oxidation resistance.

Conclusion

8. No claim is allowed.
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sudhakar Katakam whose telephone number is 571-272-9929. The examiner can normally be reached on M-F 8:30 AM - 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel Sullivan can be reached on 571-272-0779. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sudhakar Katakam/
Examiner, Art Unit 1621